

Preparing for Disaster:
Developing a Hospital Emergency Augmentation Team

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A Capstone Presented to the Graduate Faculty of the
of the University of Virginia in Candidacy for the Degree of
Doctor of Nursing Practice

University of Virginia
School of Nursing
May, 2016

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Abstract

A widespread variation exists within the United States on the best and most efficient way for hospitals to prepare for and respond to a hazardous materials mass casualty incident surge of patients. Current literature is limited, based on expert opinion, and supports a hospital based team to augment the emergency department as a safe practice for such events. Augmentation teams ensure patient safety together with timely and appropriate care. The purpose of this project was to evaluate the readiness of an academic medical center to establish an augmentation team in order to prepare for hazardous material mass casualty events. The project was a three-phase multi-method descriptive cross-sectional study: first phase evaluated the readiness and availability of staff with an electronic survey of approximately 14,000 employees; second, implemented and evaluated a training program; and third, described barriers and facilitators to team development. Nine hundred sixty-six employees completed the electronic survey. Of those respondents, 60% volunteered to join the augmentation team, representing a mix of clinical and ancillary roles including: technology services, acute care, administration, and critical care areas. The largest barrier to participation was scheduling/timing of training reported by 62.6% of respondents. Thirteen employees participated in the training; four were nurses and seven from primary clinical areas. The goal of this project was to initiate quality improvements of the current disaster operational plan. Projects such as this will assist healthcare professionals improve best practices with an improved understanding of the recruitment and engagement of a hospital disaster augmentation team.

Keywords: Hospital, Team, Decontamination, Emergency Service, Disaster Planning,

Quality Improvement

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Acknowledgements and Thanks

I would like to express my gratitude and recognize those that without their support this final project would not have been possible. I am grateful for Dr. Tullmann and Dr. Westphal's on-going insight, expertise and shared knowledge that both challenged and supported me throughout this academic experience. My sincere thanks also goes to the members of the Emergency Services department, specifically Tom Berry and Beth Mehring, who without their particular support, mentorship, and guidance this project would not have come to fruition. I am very thankful for the opportunity to have been a member of their amazing team for this project.

Dedication

This work is dedicated to my husband, David, and our children Xavier and Aurelia. I am thankful for your never-ending love, laughter, and encouragement throughout this process and the awesome adventure we call life. This work is also dedicated to my loving parents, John and Jerilyn McMahan, whose words of inspiration and push for tenacity have taught me to work hard for the things that I aspire to achieve.

Preparing for Disaster: Developing a Hospital Emergency Augmentation Team

Introduction and Research Question

An average of 34 federally declared disasters occur in the United States annually, and throughout the world nearly one disaster requiring international assistance occurs every week (Veenema, 2007). In 2014 alone, 366 catastrophic events occurred with 147 of those being man-made disasters (Insurance Information Institute, 2015). A disaster is classified as an occurrence that has resulted in property damage, deaths, and/or injuries to a community (Federal Emergency Management Agency [FEMA], 1990). Man-made disasters can account for incidents ranging from wildfires and transportation accidents to acts of terrorism. Among the more silent but deadly hazards are those involving chemical, biological, and radiological exposures. In the last two decades events such as: the Tokyo, Japan sarin subway terrorist attack, the Pentagon Anthrax-laced letters, the Graniteville, South Carolina train accident chlorine gas release and the more recent Fukushima nuclear power plant radiation accident following an earthquake, all required both medical first-responders and first-receivers to have well-practiced decontamination capabilities accompanying general disaster response skills (Okumura, 1998; Atlas, 2002; Duncan, 2011; Morimura et al., 2013). Together these events took 26 lives and injured nearly 6,000. However, the United States lacks cohesive federal guidelines for fundamental and measurable requirements of a hospital's decontamination plan. Given this situation, many hospitals have unrecognized vulnerabilities involving disaster event planning.

In the United States, there are a number of federal regulations that influence how hospitals prepare for disasters. Notable governmental organizations such as, The Joint Commission and Occupational Safety and Health Administration (OSHA) mandated starting in 2005, that decontamination must be present in hospital emergency operations plan (JCAHO,

2010). However, these regulating bodies remain imprecise in their guidance and do not cover areas about minimum timely responsiveness or minimum staff training requirements other than testing the plan “twice a year, either in response to an actual emergency or in a planned exercise” (JCAHO, 2010, p.1). A widespread variation exists nationwide on the best and most efficient way to accomplish decontamination in the event of a chemical, biological, or radiological surge of patients into an emergency department.

“The most costly hospital is the one that fails,” is a statement that has proven true after both inadequate training and preparation have consistently been named as liabilities following major disaster incidents (United Nations, 2009, p. 2). Following lessons learned from Hurricane Katrina in 2005 with institutions vastly underprepared for all disasters, The Joint Commission required all hospitals to perform drills based on each hospital's hazard vulnerability analysis (HVA; Gervais, 2006; Kaiser Permanente, 2001). Based on the 2015 hospital HVA the greatest disaster threats in Central Virginia, not incorporating technology-based failures, from least probable to most probable are: ice storms, workplace violence, helicopter crashes, small-medium sized internal chemical spills, infectious/medical based mass casualty incidents, external chemical exposures, and severe thunderstorms. The hazard estimation (probability x severity) of a severe thunderstorm at 61% is only slightly higher than an external chemical exposure at 52% and therefore should be a high priority focus area. Central Virginia's current hospital disaster operational plan and number of qualified personnel may be inadequate to indeed respond to the demands of a chemical related disaster.

The purpose of this project was to evaluate the readiness of an academic medical center in central Virginia to establish a hospital based team to augment the ED staff during hazardous material (HAZMAT) chemical, biological, and radiological related mass casualty disasters.

Review of the Literature

In current practices throughout the nation, hospitals are utilizing one of three varied but dominate approaches to patient disaster decontamination: (a) utilize local public safety agencies such as Emergency Medical Services (EMS) to perform decontamination prior to arrival; (b) rely on a statewide or county decontamination team to respond to regional hazardous events; or (c) create a hospital based team to decontaminate victims upon arrival (Hick et al., 2003). Two out of three of these plans found in the literature present operational shortfalls for hospitals and have inherent weaknesses.

First, relying on public safety agencies to decontaminate patients at the scene will allow many exposed patients to reach a facility contaminated. During the Tokyo sarin attack in 1995, 85% of the exposed individuals at the scene self-presented to the hospital contaminated, with EMS only transporting a small minority of patients (Okumura, 1998). Therefore, relying on these local agencies to clear patients prior to arriving at the hospital is not a dependable plan.

Second, expecting a state or county-based entity to respond to the needs of one hospital in a timely matter is unrealistic, especially since their mission priority is usually accident site and spill clearance. In the Commonwealth of Virginia, there are currently thirteen different designated regional hazardous materials response teams. The Central Shenandoah Valley Team, the local chapter to Charlottesville, covers eleven counties and four major city centers over more than 5,000 square miles (Virginia Department of Emergency Management, 2015). Depending on this team to respond in a timely manner to support decontamination procedures is impractical and unsafe to the facility, staff, and patients.

Therefore, the third option, complete self-sufficiency planning is the best practice for disaster preparedness (Brands et al., 2013). Emergency management operational plans are

beginning to emphasize the organizing and training of hospital based decontamination teams as a best practice. However, the best strategies for building such teams have not yet been determined. A literature review was conducted to identify the best practices for developing and training hospital based decontamination teams to augment the emergency department during a disaster.

Literature Review Results and Summary

A literature search was conducted to identify best practices for hospital-based disaster decontamination preparedness operations. The search engines MEDLINE (Ovid), PUBMED, CINAHL, Cochrane and the gray literature “Google Scholar” were accessed using AND/OR Boolean operators with the key terms and mesh headings: (a) “disaster;” (b) “decontamination;” (c) “team;” and (d) “hospital” yielding nine publications. The articles reviewed contained six case studies and three guidelines that concentrated on developing, training, practicing, and sustaining teams to augment an emergency department in the event of a mass casualty incident requiring decontamination capabilities. The main themes consistent within these case studies and guidelines indicated team development was practical although several potential barriers were identified. Figure 1 provides a pictorial representation of the literature findings with the key components of the team in blue, the predominant barriers to team formation and sustainment in red surrounding the team components and the gaps identified highlighted by a question mark.

Team Composition

Comprehensive planning is the first line of defense for all emergencies (Occupational Safety and Health Administration [OSHA], 2005). The literature supports the application of this statement in decontamination team development. Five of the nine articles recommended that volunteers comprise the membership of the teams due to the time commitment and the unique training necessary for maintaining a working crew (Harvard School of Public Health, 2014;

Barajas, Stewart, & Combs, 2003; Edwards et al., 2007; OSHA, 2005; Zavotsky, Valendo, & Torres, 2004). Mandating individuals to join a specialized team with inherent risks critical to patients, staff, and institutional safety was generally considered a prescription for failure. The literature recommended recruitment of facility employees with an applicable work history (EMS, fire, military, etc.) and strong mutual interest in participating in disaster readiness preparation. These qualities were considered important in reducing turnover and burnout (OSHA, 2005; Zavotsky, Valendo, & Torres, 2004). Team composition should be based on a mixed non-clinical and clinical training model in order to ease one sections demand for supporting personnel. Establishing clinical diversity, ranging from different areas throughout the hospital and even areas that may not routinely interact with patients was shown to improve the teams depth while not compromising routine hospitals operations and ability to provide continuous high quality medical treatment for its patients (Barajas et al., 2003; Bulson, Bulson, & Vande Guchte, 2010; Harvard School of Public Health, 2014; Hick et al., 2003; OSHA, 2005; Powers, 2007).

Team Size

As far as determining the optimum number of trained decontamination personnel on the team, a “minimum of 20 members in non-metro areas to sustain 24-hour scene support,” was recommended by Hicks et al. (2003, p. 384). Other sources supported at least one team of 6-8 members, adjusting as the situation permits (Barajas et al., 2003; Bradley, 2000; Edwards et al., 2007; OSHA, 2005; Powers, 2007; Zavotsky et al., 2004). None of the articles provided details about worksite origin of the team personnel (environmental services, ED, administration, etc.) or specific recruitment techniques utilized. The lack of description of specific recruitment strategies and techniques presents a gap within the best practices for developing an augmentation

team. Understanding how to recruit optimal membership for the team is key to functional success and sustainability.

Team Training

Beyond initial formation of the team and in order to make participation in initial and on-going training practical, several articles suggested a tiered approach for training versus all at once (Barajas et al., 2003; Powers, 2007; Harvard School of Public Health, 2014; Edwards et al., 2007; Zavotsky, Valendo, & Torres, 2004). By spreading personnel training out over a year ranging from monthly to quarterly as opposed to 8-hour blocks, all at once, is less intimidating and potentially more sustainable. This approach promoted a balance between primary institutional responsibilities and extra decontamination team training responsibilities. The training agencies utilized varied throughout the teams. However, the EnMagine Inc.'s "Hazmat for Healthcare" {www.enmagine.com}, was mentioned most often as a useful training source (OSHA, 2005; Hick, 2003; Harvard School of Public Health, 2014).

Team Development Barriers

The development of a decontamination team is not without obstacles and barriers. Specific baseline training was identified as necessary in order to safely participate in decontamination procedures and therefore required significant team member commitment. Practice does improve real time performance and therefore, after initial preparations, on-going training, and at least one annual drill involvement was encouraged. Bulson et al. (2010) reported that it took three years to develop a consistent reliable cohort to establish a team due to staff turnover.

The most significant barrier to establishing a team was financial support, especially in the early phases of development. Edwards et al. (2007) wrote, "cost containment needs of the

hospital, combined with the lack of potential for revenue generation, frequently gives the initial review of such needs assessment proposals an unfavorable reception" (p. 124). It is difficult to economically justify disaster preparation or lives saved with a decontamination team especially since the U.S. in general shows a trend toward relieving victims of disaster while consistently underinvesting in prevention (Healy & Malhotra, 2009). Therefore, strong institutional backing is needed to support staff member's time through training, and to sustain operations during the early phases of team development. Those teams that did not report an economic barrier to team development had faced recent terrorist threats (Barajas, Stewart, & Combs, 2003) or received grant money in the early evolving stages (Bulson et al., 2010).

Literature Limitations

The articles and guidelines evaluated embody recommendation rooted only in experience and although not necessarily generalizable to all institutions, they do represent a good reference to improve disaster preparedness for first-receivers across the nation. Using the U.S. Preventive Services Task Force (USPSTF) evidence based practice recommendations, these articles provide Levels IV and V evidence, and therefore currently do not allow for high-level recommendations to be drawn, however, they do provide a foundational starting point for team operations. The articles did consistently lack clear reporting or recommendations for initial team recruitment and formation. Furthermore, it is not clear what work areas within the hospital the team members originated from or details on where to begin instituting team enrollment techniques. Without this information a gap exists within the best practices recommendation for developing a disaster augmentation team. Understanding where to begin the process to assemble an optimal augmentation team is key to complete operational success. Overall, consistent themes were

present throughout the literature supporting the presence of an augmentation team to ensure facility, personnel, and patient safety as well as timely and appropriate patient care.

Research Question

In order to improve the response capacity of emergency departments during a disaster, this capstone study evaluated:

1. How many personnel in a medical center meet the qualifications for HAZMAT/Mass Casualty team membership?
2. How many qualified personnel are interested in further engagement and training to prepare for an emergency?

Methods

Current hospital disaster operations plans and qualified personnel may be inadequate to meet the demands of a HAZMAT exposure related disaster. The purpose of this project was to evaluate the readiness of an academic medical center to establish a hospital-based team to augment the ED staff during HAZMAT chemical, biological, and/or radiological related mass casualty disasters.

Definition of Terms

Augmentation team. Team established utilizing organic hospital based employees working in areas outside the emergency department to support first-receiver hospital patient care efforts during a mass casualty event.

Emergency Response Awareness Program. The Emergency Response Awareness Program educates health system employees about disaster preparedness for hazards that may impact their area and familiarizes them in basic disaster response skills, such as activation of disaster operations, mass casualty triage, evacuation procedures, medical

sleds, and HAZMAT procedures. This program was written and taught by the researcher for the purposes of this project.

First-receiver. This is the hospital, assuming a primary HAZMAT incident itself is not at the hospital site, but rather at a distant location where a hazardous substance released or event has occurred. The exposure to first receivers is limited to the quantity of substance arriving to the hospital on contaminated victims, their clothing, or other personal effects (OSHA, 2005).

HAZMAT. Hazardous Materials are things that may cause injury or death such as explosives, gases, flammable liquids, toxic materials, radioactive materials, infectious agents, and/or corrosive materials.

ICS. Internet Calendaring and Scheduling is a universal format for calendar files utilized by various calendar and email programs including Google Calendar, Apple iCal, and Microsoft Outlook. These files allow a user to auto populate, share and publish information directly from or to their electronic calendars on a computer or smartphone.

Mass Casualty Event. (MCE), also referred to as Mass Casualty Incident (MCI) indicates a combination of patient numbers and care requirements that challenge or exceed a hospital's ability to provide adequate patient care as well as routine operations and has the potential to quickly exhaust resources available for response. MCE/MCIs may include: (a) more conventional events such as transportation incidents, burns, or severe weather events; (b) unintentional/ accidental release or act of terrorism events such as chemical, biological, radiological, or nuclear agents; or, (c) catastrophic health events such as nuclear detonation, major explosion, major hurricane, or pandemic influenza (Center for Emergency Management, 2014).

Research Design

This multi-method descriptive cross-sectional study involved conducting electronic web-based surveys of the approximately 14,000 employees at a central Virginia academic medical center, writing an applicable training program, as well as conducting at least two baseline training iteration.

Setting and Sample

Setting. This study took place at a 650 bed academic medical center in central Virginia with 17 acute care units, 13 critical care units and a 56 bed level one trauma center emergency department. This medical center admits approximately 28,000 patients and treats approximately 60,000 emergency visits annually. The Health System employed 14,933 employees at the time of this project.

Sample. The sample frame for this study included all 14,933 employees at this level-one trauma medical center from September 2015 thru December 2015. An invitation to complete an electronic survey was sent to each of the employees within this sample frame. The 966 (6.5% response rate) respondents who complete the survey made up the sample.

All responding employees who met the following criteria were included in the study sample:

1. Have access to an assigned health system email.
2. Have access to their health system email from September 1, 2015 thru November 2015.

Employees not eligible for participation will include: Individuals who fall within a time-limiting employment at the health system and/or do not have access to their health system assigned email during the designated time frame. The medical center Human Resource

department's rules and regulations restrict part-time and contracted employees' participation in non-primary duties during the time of the study.

Procedures

The study was conducted in three phases.

Phase 1 Existing staff and readiness. Eligible participants were sent The Augmentation Team Survey (Figure 2) formatted in a secured web-based questionnaire {SelectSurvey.NET} with 10 questions and demographic data components delivered in their health system sponsored email.

Phase 2 Initial team training. Upon selecting “done” and completing the Augmentation Team Survey a two question “Thank You” screen was populated allowing participants to: (a) enter a drawing for a health system coffee stand gift card; and (b) provide their contact information expressing further interest in the augmentation team (Figure 3). Providing their contact information on the “Thank You” screen’s question 2: “If are you interested in learning more about the hospital augmentation team please also provide your contact information below,” acknowledged their individual consent to participate and be contacted.

Those individuals who provided contact information were invited to attend the Emergency Response Awareness Program training. The rationale for including the Emergency Response Awareness Program in this study was to evaluate the follow through intent of the individuals who provided their contact information and expressed continued interest in the augmentation team. On a space available basis, 298 invitations to attend one of the two scheduled 2-hour programs were delivered to their health system sponsored email. Emergency Response Awareness Program participation provided an opportunity to receive fundamental disaster and emergency response training. Participation in this training was voluntary, off the

employment site, not associated with a volunteer's employment at the health system and their time was not compensated at an hourly wage.

Phase 3 Determining barriers and facilitators to team development. All subjects who provided their contact information expressing interest in the hospital augmentation team received an electronic web-based {SelectSurvey.NET} follow-up survey of four questions (Figure 4). Those subjects who completed the 2-hour training were asked to complete this survey as a post-course item to identify facilitators and future barriers to their eventual voluntary participation in the hospital based augmentation team training. Those subjects who did not attend the training received the same survey in order to identify barriers to their nonparticipation.

Measures

The Phase 1 survey (Figure 2), developed by the investigator, consisted of pertinent questions based on determining if the health system had an appreciable number of qualified staff members to develop an emergency response augmentation team. Each question had a purpose and rational. Question 1: "If a natural, technological or human-caused disaster happened today in this region how prepared is/are: The hospital, your unit, you/your family?" was included to measure a baseline impression of the health system employees perceptions. For example, selecting "Very Prepared, Plan Available and Practiced" for the hospital may convey that not only is there no interest in a hospital augmentation team, but that employees feel there is not a need. Establishing baseline opinions on overall preparedness assisted in further interpreting identified participation or nonparticipation by respondents.

Question 2: "If [The academic medical center] developed an In-hospital Disaster Response Team in the future would you participate?" initially defined how many respondents were interested in further engagement and team development. Question 3: "On average how

many hours per month do you currently volunteer,” was written to draw out individual traits as well as current time commitments and obligations outside participation in the augmentation team. Question 4: “Do you have any experience in disaster response or preparedness,” was written consistent with the literature findings to identify individuals with applicable work history and strong mutual interest in augmentation team participation. Question 5: “Please select the role that appropriately identifies you relating to patient care,” identified those individuals who are clinical and non-clinically based.

Questions 6, 7, 8, 9, and 10 are comprised of demographical information such as area of work, length of employment, age, gender, and race. All of this information was critical for the current study and future strategic recruitment, planning, training, and sustainment operations of the augmentation team. Determining demographic trends in participants who elected to participate in the augmentation team will assisted in establishing best practices for recruitment and sustainment procedures within this setting.

The Phase 2 “Thank You” survey, developed by the investigator, consisted of identifiable information questions. This phase was included to potentially identified subjects who were truly interested in further engagement and training for a hospital based disaster augmentation team. This separation between the initial Augmentation Team Survey and the “Thank You” screen preserved anonymity of the information provided.

The Phase 3 follow-up survey (Figure 4), developed by the investigator, consisted of questions based on common barriers reported in the literature. The answers to these four questions were included to potentially identify the presence of barriers to team maintenance and development that may be unique to this sample.

All the surveys utilized were developed by the investigator for the sole purpose of examining this studies research questions and have not been psychometrically validated.

Additionally, since this study was unique and never previously conducted there was not an established acceptable survey response rate for comparison.

Data Analysis

The investigator exported the raw comma separated values (CSV) data obtained using SelectSurvey.NET into an Excel spreadsheet. Data from each of the three phases was analyzed with descriptive statistics based on frequencies and trends of responses in order to identify qualified personnel as well as barriers and facilitators to establishing a team.

Protection of Human Subjects

Informed consent was implied with submission and obtained from each subject by selecting the survey's "done" acknowledgement button (Figure 2). A statement prior to final electronic submission of the survey stated:

The information that you give in the survey will be anonymous which means that your name will not be collected or linked to any of the answers you provide on this page. By selecting "Done" (below) you are doing so voluntarily and your participation or nonparticipation will have NO effect on your current or future employment status.

Additionally by validating your interest or non-interest in this voluntary team in NO way obligates your future participation.

An opportunity to earn a \$5 gift certificate, redeemable at the health system coffee shop, was offered through a lottery-based system to participants after his/her completion of the survey in appreciation of his/her contribution to the project. Funding of the coffee cards was provided by the Emergency Services department administration. The opportunity to enter the lottery for

this coffee card was offered after completing the initial survey in order to protect and separate the participant's anonymous feedback from their contact information (Figure 3). There were no additional incentives offered to participate in training.

This study was submitted to the Institutional Review Board for Social and Behavioral Sciences (IRB-SBS) for their review and approval (Figure 5). Modifications were made after Phase 2 completed due to an unanticipated robust response of individuals who expressed further interest in the hospital emergency augmentation team development. In order to both support the projects findings as well as future real world application of the outcomes for the Health System the original purposed training model was altered, reviewed and approved by the IRB-SBS (Figure 6).

Results

The data was reported and analyzed by phase of execution.

Phase 1

The Phase 1 survey, (Figure 2), was sent out in September to 14,933 employees via email for a 6.5% (N=966) response rate. These 966 survey responses were complete and analyzed from the employee sample. The survey (Figure 2) took an average of four minutes for respondents to complete. Most employees who participated were female (76%, n=734) and the greatest proportion of respondents self-identified with "White or Caucasian" (81.3%, n=785). The ages ranged from 18 to 74+ year olds with individuals within the 45 to 64 year olds comprising over half of the age groups (53.9%, n=520). There were no statistically significant differences in demographic characteristics between all respondents and those who volunteered for augmentation team participation using a 95% confidence interval. See Table 1 for participant demographics.

The first question of the survey (Figure 2) established a baseline opinion on overall preparedness respondents had of the “hospital” as a whole, their “unit” and individually in the event of a disaster striking “today.” Collectively 72% (n=700) of respondents felt the hospital was “prepared” to “very prepared,” trending downward to only 30% (n=294) reporting, “prepared” to “very prepared” individually or as a family for a disaster (Figure 7). The second questions of the survey determined the overall interest in volunteering for a hospital emergency response augmentation team. An unanticipated 60% (n=580) of the sample identified they were interested in participating (Table 2). When comparing those who volunteered to non-volunteers in the field of preparedness for disaster the only statistically significant factor was that those who selected not to volunteer identified more with “not prepared” individually or as a family for a disaster (CI 95%, $p < 0.01$).

The numbers of respondents by care area included a mixed response from the different sections within the hospital with over 50% (n= 484) from direct care roles (e.g. physicians, nurses, Patient Care Technicians, etc.), approximately 30% (n=289) from supportive care roles (administrative, facilities, finance, media, marketing, technology, etc.) and just under 20% (n=189) from indirect care roles (Guest Services, laboratory, pharmacy, radiology, nutrition, therapies, etc.; Table 2). Similarly, respondents reporting years of service at the hospital captured a diverse representation (<1 year to >20 years) with the largest percentage (29.2%, n=282) from within the 1 to 5 year group and the second most common group being greater than 20 years (19.6%, n=189). When comparing team volunteers to non-volunteers those individuals between “11 to 15 years” of service were less likely to participate by a statistically significant factor (CI 95%, $p = 0.02$).

One barrier identified from the literature to augmentation team development was the extensive time commitment to training. In order to determine current obligations and time commitments, outside of the team time requirements, respondents were asked to categorize the hours per month they currently volunteered. More than 11% (n=113) of the sample reported volunteering 10 hours or more per month with the greatest percentage (62.8%, n=71) of those individuals also expressing interest in the augmentation team. Respondents who reported zero volunteer hours (42.5%, n=411) were also less likely to volunteer for the augmentation team (CI 95%, $p=0.055$); however, those who only volunteered a few hours/month (1 to 4 hours; 35%, n=338) were more likely to participate in the augmentation team (CI 95%, $p=0.099$) (Table 2).

The fourth question of the survey (Figure 2) addressed qualification and strong mutual interest in augmentation team participation by identifying 37% (n=357) of respondents with applicable work history and background in disaster response with nearly 75% (n=267) of those individuals also volunteering for the augmentation team. When comparing team volunteers with non-volunteers, under the umbrella of experience in disaster response, the survey findings paralleled the literature, displaying those who volunteered for the team to also be more qualified (CI 95%, $p<0.001$; Table 2).

Further analysis of the 60% (n=580) of respondents who expressed future interest in the hospital emergency response augmentation team revealed that the greatest raw count of volunteers came from acute care units (n=57), while the highest proportion from within technology services (n=37, including Epic, Health Information Technology, Health Information Services, computer operations, etc. areas; CI 95%, $p=0.09$). Looking within this sub-group of volunteers additional areas of employment within the hospital that represented greater than average proportions of interest included in order: (a) technology services; (b) acute care; (c)

microbiology/ laboratory; (d) critical care; and (e) administrative (Table 3). Emergency Services (including Emergency Department, Medic V and Pegasus, etc. employees) were excluded from this analysis given the fact that the augmentation team is designed to assist the emergency department during a disaster.

Phase 2

This phase of the project was conducted to differentiate individuals who were genuinely interested in volunteering for the hospital augmentation team from those who simply selected “yes I am interested” on the survey by provide their contact information (Figure 3). When comparing the Phase 1-survey results in which 60% (n=580) of the respondents endorsed “yes” that they had interest in disaster augmentation team participation, 53.3% (n =309) of them provided their contact information. Over half of the sample 53% (n=520) signed up to participate in the coffee card raffle in which 16 cards were awarded.

Phase 3

This phase of the project was conducted in order to begin training and formation of the augmentation team as well as identify barriers and facilitators to team future development. After Phase 1 and 2 were completed Phase 3 was initiated seven weeks prior to training, with an invitation delivered via email to 298 self-identified individuals in October (11 were undeliverable). This invitation employed scheduling software, Constant Contact®, allowing participants to register for one of the two, 2-hours Emergency Response Awareness Program training sessions. Upon registration and ease of communication, the software provided an ICS file extension allowing time, date, and locations of the training to populate on an electronic calendar of their choice. Training reminders were not employed and a second invitation was not sent out prior to training. Forty-three participants signed up (14.4% response rate) with a total of

13 individuals actually attending (4.3% of originally interested n=309, 30.2% attendance of anticipated n=43) the training.

Once the training sessions were completed the following week the “follow up survey” (Figure 4) was deployed via email to the same 298 self-identified individuals interested in disaster augmentation team participation. This survey aimed to determine the presence of supplementary barriers that may be unique to this sample. One hundred and thirty-five (45.3% response rate) responded to this survey with approximately 9% (n=12) of respondents having attended the scheduled training representing 92.3% of all attendees (n=13). The survey took the respondents an average of three minutes to complete.

Those individuals who did attend training (n=12) reported six trends with: (a) an excitement to serve; (b) overall interest in the team; and (c) convenient training time/date accounting for 83.3% of all responses within this section. Those same training attendees reported few future barriers to training with 50% (n=6) selecting, “no barriers foresee,” and all others selecting either: (a) scheduling; or (b) duration of training being the only other categories identified.

The barriers to initial training attendance, identified by those who did not attend (n=123), fell into one of six different categories: (a) the scheduling; (b) the communication of the training; (c) lack of continued interest; (d) unsupportive chain of command; (e) the location; and (f) time commitment of training not meeting the respondents expectations (Table 4). Scheduling due to date or time for various reasons was the most frequently reported barrier accounting for 62.6% (n=77) of the responses and communication of the training reported as an obstacle for 25.2% (n=31). Many of the qualitative comments mentioned within this section focused around scheduling and communication including:

- “I need over 9 weeks advance notice in order to ask off.”
- “The notification of the event was not made in time enough to adjust work schedule.”
- “Don't recall receiving an invitation.”
- “The email invitation came while I was out of town ...I did not see evidence of a second email/reminder.”
- “A weekend session might be nice instead of 2 hours at the end of the day.”

Discussion

There were four main findings from this project identifying the: (a) baseline preparedness of the hospital; (b) the number of personnel in an academic medical center qualified for HAZMAT/Mass casualty team membership; (c) the number of qualified personnel interested in future training for this team; and (e) the barriers to current and future team development.

Preparedness and Availability

Before identifying if the hospital had qualified personal two foundational questions were asked in Phase 1 of this project to establish a baseline understanding of overall preparedness and availability of the respondents. Based on consistencies with the literature if most respondents had the impression that the hospital was overly prepared, they might not want to volunteer for a team to support future preparedness. This was not the case; in fact, an impressive 72% (n=700) of the employees felt the hospital was “prepared” to “very prepared,” and still 60% (n=580) of these employees reported that they would volunteer for the augmentation team. Further, those who did not volunteer for the augmentation team reported “not prepared” individually or as a family for a disaster ($p <0.01$). This statistically significant finding may simply mean that those who are not organized for a disaster at home are less likely to want to leave and help others more

readily. However, taking these findings further could posture future recruitment efforts.

Conceivably by providing personal and at home preparedness training to hospital employees may enable them to more readily support the hospital during a disaster on an augmentation team.

Additionally, improving personal preparedness has broader implications beyond the development of the augmentation team and the hospital Human Resources department should logically consider providing formalized person preparedness education to all employees. In order to sustain the workforce as a whole and invest in a healthy work environment routine disaster preparedness training should be a part of the organizational manpower blueprint. If an employee has a tool kit of personal preparedness training and can take comfort in knowing their family is organized during such events they may be more personally effective at work during times of crisis. The greater proportion of individuals and families who are prepared for disaster situations the more an organization and the larger community will benefit. Overall, these findings demonstrate, in the respondent's perceptions, that the hospital appears to be prepared and therefore the hospital Emergency Services leadership is achieving their outcomes.

The second foundational question (question 3, Figure 2) in the survey aimed to determine the availability of participants to indeed volunteer their time to the augmentation team. The rationale being that training does take time and if volunteers were over committed then they would not be able to promise additional time to the team. The greatest percentage of respondents (88.3%, n=853) reported volunteering less than 10 hours per month, which may have led to increased volunteerism for the augmentation team (Table 2). However, the opposite occurred, those respondents reporting zero volunteer hours were less likely to volunteer for the augmentation team ($p=0.055$). Additionally, and more interestingly, those respondents who only volunteered a few hours/month (1 to 4 hours) were more likely to participate in the augmentation

team ($p=0.099$). Individuals in this sample, that did not have any volunteer commitments, also did not elect to add any by volunteering for the augmentation team, however, if they were minimally commitment elsewhere they were more likely to sign up for more. Figure 8 is a graphic representation of this phenomenon. For those who volunteered to be on the augmentation team they are systematically different from non-volunteers in their availability to participate. The trend of these responses went on to show the more hours an individual volunteered per month the greater proportion of the total population would report interest in joining the augmentation team.

Overall, these two questions showed foundationally: (a) respondents identified that the hospital was prepared and over half were willing to further contribute their time toward future preparedness on the augmentation team and; (b) those individuals who volunteer their time the most per month were more likely to also sign up for the augmentation team.

Qualified Personnel

Phase 1 of this project identified 580 individuals who were interested in participating in a disaster augmentation team with 46% (n=267) also reporting applicable work history or experience in disaster preparedness as reported by OSHA (2005) and Zavotsky et al. (2004). This subgroup of individuals demonstrates that the hospital does have qualified personnel to develop the team. Going a step further, the survey findings mirrored the literature, comparing team volunteers with non-volunteers, demonstrating at a statistically significant proportion that respondents who were qualified for team membership did also volunteer ($p<0.001$; Table 2). These respondents also provided a diverse representation of the hospital, which is critical to not deplete any one section while also supporting continuous high quality medical treatment for its patients. One section that was over represented from within the qualified respondents was

Emergency Services. In order to accurately improve the response capacity of emergency departments during a disaster, qualified Emergency Services employees (ED, Pegasus, Medic V; n=28) may need to concentrate their efforts to support the ED, and therefore should not be considered in the qualified figures. After removing these employees from the count 239 individuals qualify to develop an augmentation team. Overall, the hospital has 1.6% (n=239) of its current 14,933 employees as qualified personnel to begin building an augmentation team. This is a solid starting pool of capable individuals to focus future recruitment efforts and grow the team.

Interest in Future Team Engagement

It is often easier to volunteer in theory than in practice and Phase 2 and 3 sought to better understand motivations and application of such volunteerism. When prompted for future engagement, just over half, 53.3% (n=309), of the Phase 1 volunteers actually provided their contact information at the end of Phase 2. With the list of volunteers reduced in half, Phase 3 revealed most accurately the interest in future team engagement. Of the original 580 respondents who had expressed interest in the augmentation team 7.4% (n=43) signed up for the initial team training with only 2.3% (n=13) actually attending. Executing the last two phases of this project demonstrated how large a gap could exist between willingness to serve on a disaster augmentation team and functional participation. However, training 13 people is the first step in many to full development of the augmentation team. These 13 trained augmentation team volunteers support a solid foundation from which to build. The literature findings suggested a team of at least 6-8 personnel depending on the disaster situation (Barajas et al., 2003; Bradley, 2000; Edwards et al., 2007; OSHA, 2005; Powers, 2007; Zavotsky et al., 2004). And Hicks et al. concluded a team with a, “minimum of 20 members in non-metro areas to sustain 24-hour scene

support," was recommended (2003, p. 384). Paralleling the team size findings for an augmentation team, this group is comprised of: (a) all volunteers, reinforced by the findings in Harvard School of Public Health (2014); Barajas et al.(2003); Edwards et al. (2007); OSHA (2005); and Zavotsky et al. (2004); (b) had applicable work history and strong mutual interest supported by the findings in OSHA (2005) and Zavotsky et al. (2004); (c) mixed non-clinical and clinical backgrounds maintained by findings in Barajas et al. (2003); Bulson et al. (2010); Harvard School of Public Health (2014); Hick et al. (2003); OSHA (2005); and Powers (2007); and (d) embodied at least one team of 6-8 members covered by the findings in Barajas et al. (2000); Bradley (2000); Edwards et al. (2007); OSHA (2005); Powers (2007); and Zavotsky et al. (2004), although not quite the expressed minimum of 20 members suggested to sustain 24-hour scene support suggested in Hicks et al. (2003).

Barriers to Current and Future Participation

The barriers identified in this project did not parallel those of the research as closely as many of the other findings. Through Phases 2 and 3 of this project only 2.3% (n=13) of the originally identified interested volunteers participated in training but 23.3% (n=135) of them responded to the barriers and facilitators survey demonstrating there is room for future participation and team growth. This Phase 3 survey identified that the predominant barriers to initial training attendance were: (a) scheduling and; (b) awareness of the training. Both of these factors can be mitigated by providing additional training opportunities at different times and at least 9 to 10 weeks in advance for those on a clinical schedule. This program fell short by only allowing seven weeks of advanced notice for the participants to plan accordingly. Additionally, there was only one notification of training. Based on the qualitative feedback of the survey more than one email invitation with training reminders would be a more effective means of clearly

communicating opportunities. Neither of these barriers were identified within the literature and appear unique to this sample group.

A non-barrier to this population but identified in the literature as the largest obstacle to augmentation team development was financial due to the up front costs of training reported by Barajas et al (2003), Bulson et al. (2010) and Edwards et al. (2007). This project established stakeholder buy-in early and an enormous support in the form of time and resources from the Emergency Services department at the hospital. Due to this on-going leadership investment augmentation team membership will soon accompany a new supplemental job description with an established pay rate for future participation and activation. Even though an “excitement to serve” and “basic interest” in the team were the two most identified facilitators to participate this effort and success will undoubtedly grasp the interest of individuals who may have not volunteered originally without identified compensation.

One unmeasured barrier that was identified in the literature by, Bulson et al. (2010), is team turnover reporting a span of three years to develop a consistent reliable team due to such turnover. It is too early to tell if the 13 individuals who have received training will continue to participate. The next phase of team membership and participation planned for this group is training in PPE donning and doffing as well as practical HAZMAT MCE exercise scheduled for spring 2016.

Recommendations for Future Development and Research

This project provided one way to recruit and develop a disaster augmentation team that if continued will undoubtedly improve the hospitals disaster response capabilities. Whether these recruitment strategies are sustainable is still to be determined and should be the focus of future research. The first survey deployed, in Phase 1, revealed sections within the hospital the

augmentation team volunteers originated from. Technology Services areas demonstrated the greatest, approaching statistically significant, proportion of interest and should be one of the first areas to recruit from for future operations and sustainment. Other areas such as: (a) acute care; (b) microbiology/ laboratory; (c) critical care; and (d) administrative sections demonstrated an increased interest in the augmentation team and should also be in future team recruitment plans. Most of these areas of recruitment are clinically based, however, the volunteerism from Technology Services and administrative sections demonstrates how ancillary support services within a hospital may have a motivation and desire to help during a disaster much like those in a clinically based primary care roles. These departments should not be overlooked and will provide an essential balance to the augmentation team as a whole.

An additional future augmentation team recruitment target population revealed by the Phase 1 survey focused on respondent's years of experience working at the academic medical center. Nearly half (47.3%) of the augmentation team volunteers had less than or equal to five years working at the hospital. With this in mind new employee orientation and/or annual training requirements should provide an opportunity to offer team membership directed at newer employees. It is not clear exactly why the newer employed cohort shows a greater interest in the augmentation team but team membership may strengthen their resume toward climbing the clinical or administrative ladder. Conversely, the survey also revealed areas to provide fewer recruitment efforts. Interestingly, respondents with 11 to 15 years of employment at the hospital were statistically significantly ($p = 0.02$, Table 2) less likely to volunteer for the augmentation team. Their exact motivations are not be known but it may be due to the developmental stage in their career. After 10 years of employment this cohort of individuals may hold roles of great leadership responsibility and may experience supplementary duties that consume free time and

therefore cannot readily volunteer for the team. A better understanding of these differences in volunteerism based on years of employment could be the focus of future research in volunteer motivations.

In order to maintain interest and readiness to serve the hospital the next training sessions should be scheduled in a timely manner, providing 9 to 10 weeks advanced notice and offered quarterly. With 108 of hospital employees expressing future interest in the augmentation team, who were not able to attend due to timing or being uninformed of the initial training sessions, there is potential for team immediate growth in the months to come (Table 4). The length of training should be considered and continued to be based on the literature in a tiered approach and not all at once to allow for a continued balance between primary institutional responsibilities and augmentation team duties (Barajas et al., 2003; Powers, 2007; Harvard School of Public Health, 2014; Edwards et al., 2007; Zavotsky, Valendo, & Torres, 2004). The training provided in Phase 3 was conducted over a 2-hour block seemed to fit the sample's expectations with only 1.6 % (n=2) of respondents identifying this duration to be too long. Based on volunteer hours reported by augmentation team volunteers in the Phase 1 survey (Table 2) the greatest proportion of respondents (87.7%) volunteered less than 10 hours a month therefore maintaining training commitments significantly less than this may contribute toward continued participation.

Overall, this capstone project provided a foundational start toward assembling an optimal augmentation team key to operational success during a disaster while ensuring safety and timely and appropriate patient care.

Strengths of the Study

Population sampling of the entire hospital staff provided both an uncomplicated and inexpensive approach to assess availability and interest of personnel for a hospital based

augmentation team. Utilizing a survey method offered the best opportunity to obtain direct, relevant data. Better understanding of qualified employees as well as the barriers and facilitators to developing this team allows for more focused recruitment, training, and sustainment of the team in the future. Furthermore, the results of this study will be applicable to other organizations intending to establish a hospital augmentation team in similar geographic areas and settings.

Limitations of the Study

Utilizing an electronic based population sample of medical center staff through email may limit participation to only those individuals who feel comfortable using technology. Additionally, this survey approach reflects a non-response bias where the investigator cannot know if the respondents are truly representative of the broader population. Based on the demographics of the sample the results may not be broadly generalizable and limited to similar medical centers and regions. The survey tools used in this study were not psychometrically validated and a standardized acceptable response rate was not previously established.

Interprofessional Practice Implications

This study contributes to a better understanding of the development of hospital-based volunteer HAZMAT augmentation teams. Advancing knowledge of the characteristics and environmental factors that promote or detract from the development of a team may inform future strategies for recruiting and sustaining teams of this type. This study aimed to improve the response capacity of the emergency departments during a disaster, supporting safe and high quality continued continuity of care operations that will impact nurses who comprise the largest single component of hospital staff (American Association of Colleges of Nursing, 2015). Additionally, this project demonstrates how nurse responsibility and oversight in systems

leadership roles can strengthen practice excellence, promote patient safety, and enhance health care delivery.

This project informs the gap on recruitment and sustainment of augmentation teams however more research can be done. Future research should concentrate on additional recruitment strategies reviewing motivations to serve on an augmentation team and an understanding of such volunteerism based on years of employment within a health system.

With this projects findings and those yet to be uncover hospitals nationwide should begin the necessary steps toward better preparation efforts. Emergency Services departments within hospitals should evaluate their local HVA threats and begin developing their own hospital emergency augmentation team to ensure facility, personnel, and patient safety together with timely and appropriate patient care.

Products of the Capstone

The findings of this capstone project can contribute to developing strategies to identify recruitment techniques for developing hospital based response team to augment the emergency department during HAZMAT events. A manuscript will be submitted to the *Journal of Emergency Nursing's Disaster Management & Response*. The author guidelines for publishing in this journal can be found in Figure 9.

The goal of this proposal locally was to begin the process toward developing a team to augment the emergency department during disaster and improve current operations. Determining recruiting strategies to develop a sustainable team, taking into account historical barriers such as the time commitment for training and normal staff turnover, were significant areas of focus throughout the process.

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Figure 1. Literature Review Summary of Augmentation Team Composition, Barriers, and Gaps



Hospital Disaster Response Augmentation Team

Disaster Augmentation Team Survey

- The ***purpose*** of this survey is to gain an increased knowledge on a hospital based disaster augmentation team among University of Virginia Health System employees.
- The ***goal*** of the project is to assess the possibility of forming a team of UVAHS employees prepared to assist the hospital's Incident Management Team (IMT) during a disaster.
- ***Operational Concept:*** While the concept of deploying this team is not complete, participation in a disaster augmentation IMT will never compromise or replace the need for you to perform in your primary role and it would be your responsibility to obtain support from your supervisor to join an IMT. Skill sets will vary depending on incidents types; therefore, **clinical** and **non-clinical** skills will be needed.
- This survey is a collaborative effort between the health system's Emergency Services and the University of Virginia School of Nursing. This survey does have the institutional review board for Social and Behavioral Sciences (IRB-SBS) approval. All answers will remain confidential and anonymous. After survey submission a separate screen will appear to enter the lottery for a Higher Grounds gift card if desired.
- Your participation is completely voluntary and answering the following questions will help Emergency Services determine employee interest in a disaster augmentation team.

1. If a natural, technological or human-caused disasters happened **today** in this region how prepared is/are:*

	Not Prepared, No Plan	Slightly Prepared, Thought about a Plan	More Prepared, Have told others of a Plan	Prepared, Plan Available but needs PRACTICE	Very Prepared, Plan Available and Practiced
The Hospital	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your Unit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
You/Your Family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

2. If UVAHS developed an In-hospital Disaster Response Team in the **future** would you participate?*

Yes

No
 Undecided

For those Undecided (please specify why)

3. On average how many hours per month do you **currently** volunteer your time with any organization?*

0
 1-4 hours
 5-9 hours
 10-14 hours
 15-19 hours
 greater than 20 hours

4. Do you have any **experience** in disaster response or preparedness? (select all that apply)*

No
 Yes (If yes, please identify all applicable below)
 FEMA (Federal Emergency Management Agency)
 OSHA (Occupational Safety & Health Administration)
 Fire
 Police
 EMS
 Military
 Scouting (Boy Scouts, Girls Scouts, Camp Fire, etc)
 CERT (Community Emergency Response Team)
 MRC (Medical Reserve Corps)
 BDLS (Basic Disaster Life Support)
 CDLS (Core Disaster Life Support)
 Other, please specify

5. Please select the **role** that appropriately identifies you relating to patient care:*

Direct Patient Care (MD, RN, PCT, PCA, EMS, etc)
 Indirect Patient Care (Guest Services, Lab, Pharmacy, Radiology, Nutrition, Therapies, Chaplain, Physicist, Social Worker, Dental Hygienist, etc)
 Supportive Patient Care (Communications, Environmental Health and Safety, Facilities, Finance, Media, Marketing, Technology)
 Other, please specify

6. Please select the **unit/section** where you work:*

Acute Care Unit (3E, 4W, 5C, 6C, 8W, etc)
 Administrative
 Ambulatory Care

- Blue Ridge Poison Center
- Cancer Center
- Clinical Nutrition Services
- Continuum Home Health
- Critical Care Unit (MICU, STBICU, NNICU, TCVPO, CCU, etc)
- Dentistry
- Emergency Services
- Equipment Management
- Facilities Management
- Faculty/ Education
- Financial
- Human Resources
- Intermediate Care Unit (NIMU, SIMU, TIMU, etc)
- Life Support Learning Center
- Medical Education
- Microbiology, Lab, Blood Bank
- Nursing Education
- Pediatrics
- Pegasus
- Perioperative Surgical
- Pharmacy
- Physical/Occupational Therapy
- Psychiatry
- Radiology and Medical Imaging
- Respiratory and Pulmonary
- Safety & Security
- Technology Services
- Transitional Care Hospital
- Volunteer Services
- Women's Health
- Patient and Guest Services
- Nutrition Care
- Admitting
- Anesthesia
- Bed Coordination Center
- Cardiology
- Chaplaincy
- Children's Hospital
- Clinical Engineering
- Emergency Department
- Environmental Services
- Facilities Planning
- Medical Communications
- MET
- Nephrology
- Neurology
- Plastic Surgery
- Supply Chain
- Trauma
- Waste Management
- Wound Ostomy Care
- Other, please specify

7. How **long** have you been a member of the UVA Health System team?*

- less than 1 year
- 1-5 years
- 6-10 years
- 11-15 years
- 16-20 years
- greater than 20 years
- I prefer not to answer

8. Please self-identify your age?*

- 18 to 24
- 25 to 34
- 35 to 44
- 45 to 54
- 55 to 64
- 65 to 74
- greater than 74
- I prefer not to answer

9. Please self-identify your gender?*

- Male
- Female
- I prefer not to answer

10. Please self-identify your race?*

- American Indian or Alaskan Native
- Asian
- Black or African American
- Multi-Racial
- Native Hawaiian or Pacific Islander
- White or Caucasian
- I prefer not to answer

The information that you give in the survey will be handled **confidentially**. Your information will be anonymous which means that your name will not be collected or linked to any of the answers you provide on this page.

By selecting "**Done**" (below) you are doing so voluntarily and your participation or nonparticipation will have **NO** effect on your current or future employment status. Additionally by validating your interest or non-interest in this voluntary team in **NO** way obligates your future participation.

Thank you for assistance and time.

Figure 2. Augmentation Team Survey



Thank You

Thank you for Participating in the Disaster Augmentation Team Survey

This page marks the separation from all confidential feedback you provided. None of the information you entered on the previous screen can be linked to any information you provide on this page. Please complete the questions below as appropriate.

1. If you are interested in entering [the lottery for a higher grounds gift card](#) please share your **email address below:**
2. If you are interested in learning more about [the hospital augmentation team](#) **please also provide your contact information below :**

* This information will be used solely to contact you directly only in the event of team formation or future training opportunities. Additionally by validating your interest in this voluntary team in **NO** way obligates your future participation.

Name

Email address

Thank you for assistance and time.

Figure 3. Thank You Survey



Follow Up Hospital Disaster Response Augmentation Team

Disaster Augmentation Team Survey

- The **purpose** of this survey is to identify continued interest in a hospital based disaster assistance team among University of Virginia Health System employees as well as identify things that may contribute or prevent continued participation.
- Reminder: The **goal** of this project is to assess the possibility of forming a team of UVAHS employees prepared to assist the hospital's Incident Management Team (IMT) during a disaster. This survey is a collaborative effort between the Health System's Emergency Services and the University of Virginia School of Nursing. This survey does have the Institutional Review Board for Social and Behavioral Sciences (IRB-SBS) approval.
- Your assistance answering the following questions will help Emergency Services determine continued employee interest in a disaster augmentation team.

1. Did you **ATTEND** the emergency response awareness program December 9th or 11th, 2015?*

No
 Yes

2. If **NO**, What **PREVENTED** you from attending the emergency response awareness program? (select all that apply)*

My manager did not support me
 emergency response awareness program did not sound interesting
 The timing did not fit my schedule
 Not applicable, I attended the training
 I am no longer interested in serving on the disaster response team
 The training was too much of a time commitment
 Other, please specify

3. If **Yes**, What **CONTRIBUTED** to your ability to attend the emergency response awareness ? (select all that apply)*

My manager supported me
 the emergency response awareness program sounded interesting
 The timing fit my schedule
 I am excited to serve on the disaster response team
 Not applicable I did not attend the training
 Other, please specify

4. If **Yes**, Are there any potential reasons that would **PREVENT** your **future** participation in disaster augmentation team training? (select all that apply)*

- Staffing cannot support it
- Not applicable I did not attend the training
- Training requires too much time
- Unit is not supportive
- Family is not supportive
- No barriers foreseen
- Other, please specify

The information that you give in the survey will be **anonymous** which means that your name will not be collected or linked to any of the answers you provide on this page.

By selecting "**Done**" (below) you are doing so voluntarily and your participation or nonparticipation will have **NO** effect on your current or future employment status. Additionally by validating your interest or non-interest in this voluntary team in **NO** way obligates your future participation.

Thank you for assistance and time.

Done

Figure 4. Follow Up Hospital Disaster Augmentation Team Survey



In reply, please refer to: Project # 2015-0307-00

August 18, 2015

Megan Matters and Dorothy Tullmann
Academic Divisions
142 Burnet St.
Charlottesville, VA 22902

Dear Megan Matters and Dorothy Tullmann:

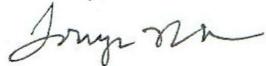
Thank you for submitting your project entitled: "Hospital Emergency Augmentation Team Development" for review by the Institutional Review Board for the Social & Behavioral Sciences. The Board reviewed your Protocol on August 18, 2015.

The first action that the Board takes with a new project is to decide whether the project is exempt from a more detailed review by the Board because the project may fall into one of the categories of research described as "exempt" in the Code of Federal Regulations. Since the Board, and not individual researchers, is authorized to classify a project as exempt, we requested that you submit the materials describing your project so that we could make this initial decision.

As a result of this request, we have reviewed your project and classified it as exempt from further review by the Board for a period of four years. This means that you may conduct the study as planned and you are not required to submit requests for continuation until the end of the fourth year.

This project # 2015-0307-00 has been exempted for the period August 18, 2015 to August 17, 2019. If the study continues beyond the approval period, you will need to submit a continuation request to the Board. If you make changes in the study, you will need to notify the Board of the changes.

Sincerely,



Tonya R. Moon, Ph.D.
Chair, Institutional Review Board for the Social and Behavioral Sciences

One Morton Drive, Suite 500 • Charlottesville, VA 22903
P.O. Box 800392 • Charlottesville, VA 22908-0392
Phone: 434-924-5999 • Fax: 434-924-1992
www.virginia.edu/vpr/irb/sbs.html

Figure 5. IRB-SBS Approval Letter



In reply, please refer to: Project # 2015-0307-00

October 14, 2015

Megan Matters and Dorothy Tullmann
Academic Divisions
142 Burnet St.
Charlottesville, VA 22902

Dear Megan Matters and Dorothy Tullmann:

Thank you for submitting the October 8, 2015 MODIFICATION to your project entitled: "Hospital Emergency Augmentation Team Development" for review by the Institutional Review Board for the Social & Behavioral Sciences. The Board reviewed your Protocol on October 14, 2015.

The MODIFICATION to this project # 2015-0307-00 has been exempted for the period October 14, 2015 to August 17, 2019. If the study continues beyond the approval period, you will need to submit a continuation request to the Board. If you make changes in the study, you will need to notify the Board of the changes.

Sincerely,

A handwritten signature in black ink that appears to read "Tonya R. Moon".

Tonya R. Moon, Ph.D.
Chair, Institutional Review Board for the Social and Behavioral Sciences

One Morton Drive, Suite 500 • Charlottesville, VA 22903
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www.virginia.edu/vpr/irb/sbs.html

Figure 6. IRB-SBS Modification Approval Letter

Table 1

*Demographic Characteristics of 966 Participants Completing a Survey
Instrument Measuring Hospital Employee's Emergency Response
Augmentation Team Qualifications and Interest,
2015*

Characteristics	N=966 n (%)	Volunteers, n=580 n (%)
Gender		
Female	734 (76.0)	427 (73.6)
Male	205 (21.2)	136 (23.4)
Non-binary	1 (0.1)	1 (0.2)
Unspecified	26 (2.7)	16 (2.8)
Age		
18 to 24	45 (4.7)	26 (4.5)
25 to 34	190 (19.7)	116 (20.0)
35 to 44	152 (15.7)	87 (15.0)
45 to 54	250 (25.9)	151 (26.0)
55 to 64	270 (28.0)	165 (28.4)
65 to 74	26 (2.7)	18 (3.1)
>75	4 (0.4)	3 (0.5)
Unspecified	29 (3.0)	14 (2.4)
Race		
American Indian or Alaskan Native	8 (0.8)	7 (1.2)
Asian	14 (1.4)	12 (2.1)
Black or African American	66 (6.8)	41 (7.1)
Multi-Racial	19 (2.0)	11 (1.9)
Native Hawaiian or Pacific Islander	3 (0.3)	3 (0.5)
White or Caucasian	785 (81.3)	427 (81.7)
Unspecified	71 (7.3)	32 (5.5)

Note. Percentages may not equal 100 because of rounding

Responses to: “If a natural, technological or human-caused disaster happened today how prepared is/are you/your:” (n=966)

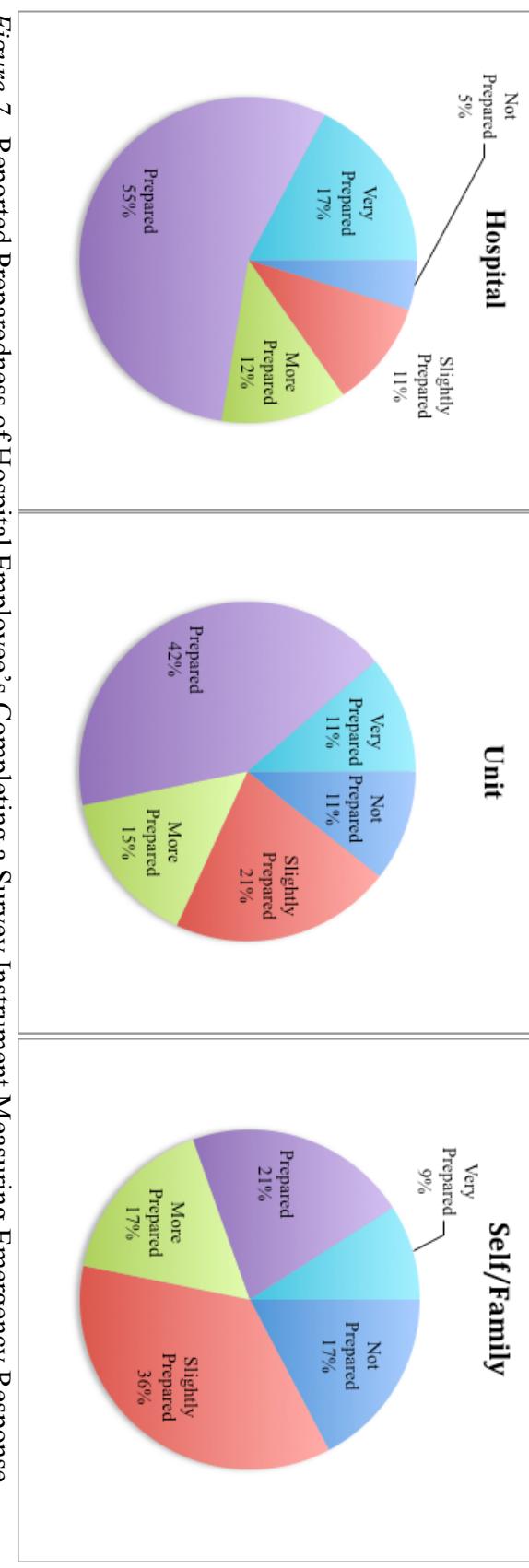


Figure 7. Reported Preparedness of Hospital Employee’s Completing a Survey Instrument Measuring Emergency Response Augmentation Team Training Interest, 2015

Table 2

Work Characteristics of 966 Participants Completing a Survey Instrument Measuring Hospital Employee's Emergency Response Augmentation Team Qualifications and Interest, 2015

Characteristics	All N=966 n (%)	Volunteers n=580 n (%)	Non-Volunteers n=141 n (%)	p-value
Years of Service				
<1	146 (15.1)	96 (16.6)	16 (11.3)	0.25
1-5	282 (29.2)	178 (30.7)	38 (27.0)	0.55
6-10	146 (15.1)	88 (15.2)	21 (14.9)	0.80
11-15	115 (11.9)	62 (10.7)	27 (19.1)	0.02
16-20	80 (8.3)	44 (7.6)	15 (10.6)	0.39
>20	189 (19.6)	109 (18.8)	22 (15.6)	0.54
Unspecified	8 (0.8)	3 (0.5)	2 (1.4)	
Patient Care Role				
Direct	484 (50.1)	302 (52.1)	67 (47.5)	0.49
Supportive	289 (29.9)	151 (26.0)	39 (27.7)	0.73
Indirect	187 (19.4)	126 (26.0)	33 (23.4)	0.72
Unspecified	6 (0.6)	1 (0.0)	2 (1.4)	
Disaster Experience				
Yes	357 (37.0)	267 (46.0)	22 (15.6)	<0.01
No	609 (63.0)	313 (54.0)	119 (84.4)	<0.01
Hours/Month Volunteering				
0	411 (42.5)	230 (39.7)	71 (50.4)	0.06
1-4	338 (35.0)	209 (36.0)	38 (27.0)	0.10
5-9	104 (10.8)	70 (12.1)	16 (11.3)	0.77
10-14	56 (5.8)	28 (4.8)	12 (8.5)	0.18
15-19	17 (1.8)	13 (2.2)	1 (0.7)	0.39
>20	40 (4.1)	30 (5.2)	3 (2.1)	0.23
Augmentation Team Interest				
Yes	580 (60.0)	580 (100)	0 (0)	
No	141 (14.6)	0 (0)	141 (100)	
Undecided	245 (25.4)	0 (0)	0 (0)	

Note. Percentages may not equal 100 because of rounding

Table 3

*Top 10 Areas of Work within the Hospital of 966 Participants Completing a Survey
Instrument Measuring Employee's Emergency Response Augmentation Team Qualifications
and Interest, 2015*

Area of Work	All N=966 n (%)	Volunteers n=580 n (%)	% of N	p-value	95% CI
Acute Care**	82 (8.5)	57 (9.8)	69.5	0.15	(58.2 - 80.8%)
Administration**	86 (8.9)	54 (9.3)	62.8	0.69	(51.7 - 73.9%)
Ambulatory Care	98 (10.1)	51 (8.8)	52.0		
Critical Care**	45 (4.7)	30 (5.2)	66.7	0.52	(51.7 - 81.6%)
Emergency Services	45 (4.7)	37 (6.4)	82.2		
Pediatrics	57 (5.9)	27 (4.7)	47.4		
Perioperative	74 (7.7)	43 (7.4)	58.1		
Radiology/Medical Imaging	47 (4.9)	26 (4.5)	55.3		
Technology Services**	50 (5.2)	37 (6.4)	74.0	0.09	(59.8 - 88.2%)
Microbiology/Laboratory**	36 (3.7)	25 (4.3)	69.4	0.40	(52.8 - 86.1%)

**Areas with $\geq 60\%$ proportions of interest in the augmentation team and hold higher than average potential future recruitment success

Note. Percentages may not equal 100 because of rounding

Table 4

Identified Barriers and Facilitators of 135 Respondents Completing a Survey Instrument Measuring Hospital Employee's Emergency Response Augmentation Team Training Participation, 2015

Categories	n (% n)
Training Attendance (n=135)	
Yes	12 (8.9)
No	123 (91.1)
Facilitators to Attending Training**(n=12)	
Excited to Serve	10 (83.3)
Sounded Interesting	10 (83.3)
Timing Fit Schedule	5 (41.7)
Manager Supported Attendance	3 (25.0)
Wanted to be Prepared	1 (8.3)
Have Experience to Share	1 (8.3)
Barriers to Future Training Attendance (n=12)	
Unit Scheduling/Staffing	5 (41.7)
None	6 (50.0)
Too Much of a Time Commitment	1 (8.3)
Barriers to Initial Attendance (n=123)	
Timing Did Not Fit Schedule	77 (62.6)
Was Not Aware of Training	31 (25.2)
Manager Did Not Support	7 (5.7)
No Longer Interested	5 (4.1)
Too Large of a Time Commitment	2 (1.6)
Location of Training Difficult to Access	1 (0.8)

**Multiple answers/person as respondents were able to select "all that apply"

Note. Percentages may not equal 100 because of rounding

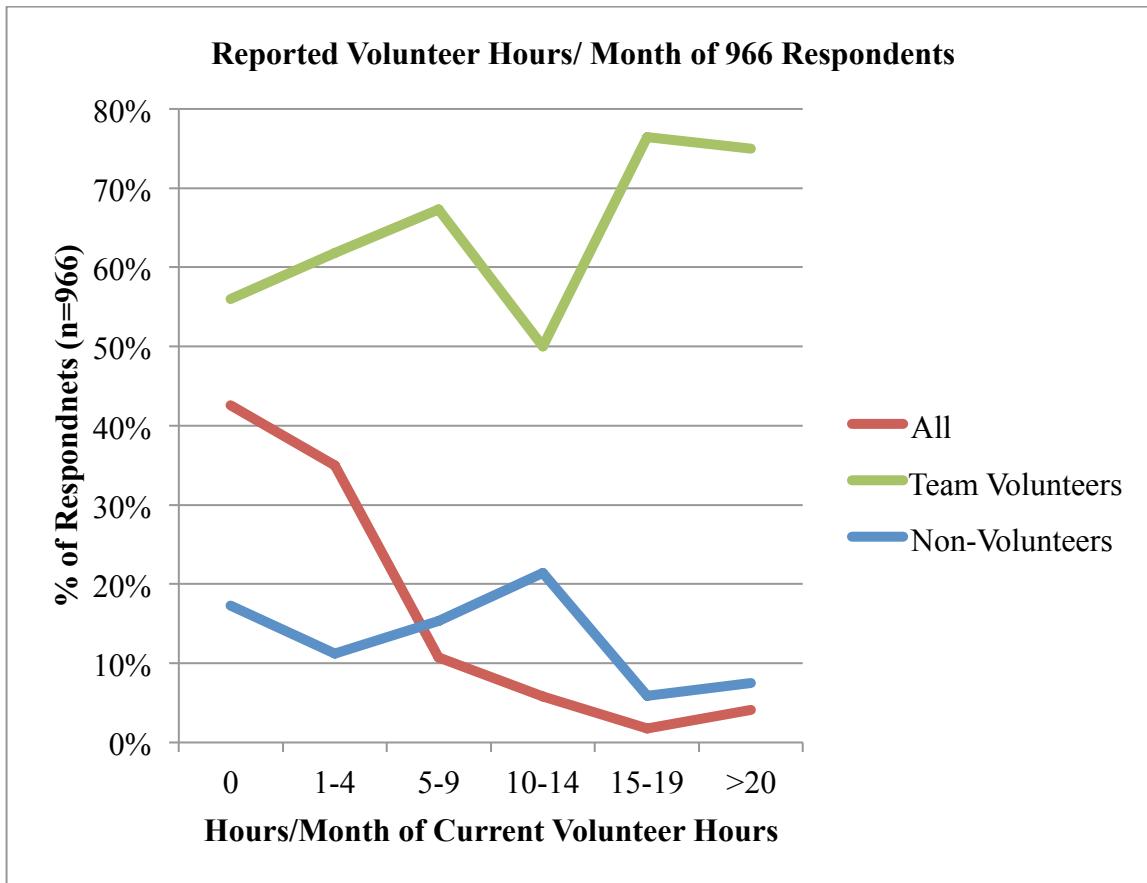


Figure 8. Reported Volunteer Hours/Month of Hospital Employee's Completing a Survey Instrument Measuring Emergency Response Augmentation Team Training Interest, 2015

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Figure 9. Journal Of Emergency Nursing Manuscript Author Guideline

Draft Manuscript

Title

Preparing for Disaster: Developing a Hospital Emergency Augmentation Team

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44

Abstract

45 **Introduction:** A widespread variation exists within the U.S. on the best and most efficient way
46 for hospitals to prepare for and respond to a hazardous materials (HAZMAT) mass casualty
47 incident surge of patients to the emergency department (ED). Current literature is limited, based
48 on expert opinion, and supports a hospital based team to augment the ED as a safe practice for
49 such events. Augmentation teams ensure patient safety together with timely and appropriate
50 care. The purpose of this project was to evaluate the readiness of an academic medical center to
51 establish a team in order to prepare for HAZMAT mass casualty events. **Methods:** The project
52 was a three-phase multi-method descriptive cross-sectional study: first, implement a survey to
53 the employees at a central Virginia academic medical center; second, conduct baseline training;
54 and third, describe barriers and facilitators to team development. **Results:** Seven hundred thirty-
55 four females, 205 males, 1 non-binary, and 26 unspecified gender employees participated in the
56 initial survey with 13 completing training. Of the respondents, 60% volunteered to support the
57 augmentation team, mostly with <5 years of experience, and from mixed clinical and ancillary
58 roles to include: technology services, acute care, administration, and critical care areas. The
59 biggest barrier to participation was scheduling/timing of training reported by 62.6% respondents.
60 **Discussion:** The goal of this project was to initiate quality improvements of current disaster
61 operational plans. Projects such as this will assist healthcare professionals improve best
62 practices with an improved understanding of the recruitment and engagement of a hospital
63 augmentation team.

64 **Keywords:** Hospital, Team, Decontamination, Emergency Service, Disaster Planning, Quality
65 Improvement

66

Introduction

67 In the United States, there are a number of federal regulations that influence how
68 hospitals prepare for disasters. Notable governmental organizations such as, The Joint
69 Commission and Occupational Safety and Health Administration mandated starting in 2005, that
70 decontamination must be present in hospital emergency operations plan ¹. However, these
71 regulating bodies remain imprecise in their guidance on fundamental and measurable
72 requirements of a hospital's decontamination plans. Given this situation, many hospitals have
73 unrecognized vulnerabilities involving disaster event planning and do not cover areas on
74 minimum timely responsiveness or minimum staff training requirements. A widespread
75 variation exists nationwide on the best and most efficient way to accomplish decontamination in
76 the event of a hazardous material (HAZMAT) chemical, biological, and/or radiological surge of
77 patients into an emergency department. A central Virginia's current hospital disaster operational
78 plan and number of qualified personnel may be inadequate to indeed respond to the demands of a
79 HAZMAT related disaster in real time. The purpose of this project was to evaluate the readiness
80 of an academic medical center to establish a hospital-based team to augment the ED staff and
81 improve the emergency department's response capacity during a HAZMAT related mass
82 casualty disaster.

83 **Review of the Literature**

84 In current practices throughout the nation, hospitals are utilizing one of three varied but
85 dominate approaches to patient disaster decontamination: (a) utilize local public safety agencies
86 such as Emergency Medical Services to perform decontamination prior to arrival; (b) rely on a
87 statewide or county decontamination team to respond to regional hazardous events; or (c) create
88 a hospital based team to decontaminate victims upon arrival ². Two out of three of these plans

89 present operational shortfalls for hospitals and have inherent weaknesses. With this in mind
90 complete self-sufficiency planning is the best practice for disaster preparedness³. Emergency
91 management operational plans are beginning to emphasize the organizing and training of hospital
92 based decontamination teams as a best practice. However, the best strategies for building such
93 teams have not yet been determined. A literature review was conducted to identify the best
94 practices for developing and training hospital based decontamination teams to augment the
95 emergency department during a disaster.

96 Nine articles were reviewed containing six case studies and three guidelines (Table 1) that
97 discussed training, practicing, and sustaining an augmentation team. The main themes consistent
98 within these studies indicated teams were practical, initial development and recruitment
99 strategies were missing and several barriers were identified. Overall, the literature supporting
100 the presence of an augmentation team to ensure facility, personnel, and patient safety as well as
101 timely and appropriate patient care.

102 **Methods**

103 This multi-method descriptive cross-sectional study involved conducting electronic web-
104 based surveys of the employees at a central Virginia academic medical center, writing an
105 applicable training program, as well as conducting at least two baseline training iteration. This
106 study took place at a 650 bed academic medical center in central Virginia with 17 acute care
107 units, 13 critical care units and a 56 bed level one trauma center emergency department. This
108 medical center admits approximately 28,000 patients and treats approximately 60,000 emergency
109 visits annually. The Health System employed 14,933 employees at the time of this project. The
110 sample frame for this study included all 14,933 employees at this level-one trauma medical
111 center from September 2015 thru December 2015. An invitation to complete an initial electronic

112 survey was sent to each of the employees within this sample frame. The 966 (6.5% response
113 rate) respondents who complete the survey made up the sample.

114 The study was conducted in three phases. The first phase with a survey to all employees
115 with 10 questions delivered in their email. Each question had a purpose and rational measuring
116 (a) the baseline impression of preparedness respondents had of the hospital, their unit and
117 themselves; (b) how many respondents were interested in further engagement and team
118 development; (c) applicable work history and strong mutual interest in augmentation team
119 participation; (d) identified clinical and non-clinical groups and (e) demographical information
120 such as area of work, length of employment, age, gender, and race.

121 The second phase evaluate the follow through intent of individuals who initially
122 identified interest in the first survey by provided their contact information and attending a 2-hour
123 baseline Emergency Response Awareness Program training. In the final phase, respondents who
124 both attended training and expressed original interest in the team were sent a follow-up survey to
125 identify barrier and facilitators to training attendance.

126 This study was submitted to the Institutional Review Board for Social and Behavioral
127 Sciences (IRB-SBS) for their review and approval.

Results

129 **Phase 1.** The 966 respondents to the initial survey were mostly female (76%, n=734) and the
130 greatest proportion of respondents self-identified with “White or Caucasian” (81.3%, n=785).
131 The ages ranged from 18 to 74+ year olds with individuals within the 45 to 64 year olds
132 comprising over half of the age groups (53.9%, n=520). There were no statistically significant
133 differences in demographic characteristics between all respondents and those who volunteered
134 for augmentation team participation using a 95% confidence interval (Table 2).

135 The survey findings established a baseline opinion on overall preparedness and
136 collectively 72% (n=700) of respondents felt the hospital was “prepared” to “very prepared,”
137 trending downward to only 30% (n=294) reporting, “prepared” to “very prepared” individually
138 or as a family for a disaster. When comparing those who volunteered to non-volunteers in the
139 field of preparedness for disaster the only statistically significant factor was that those who
140 selected not to volunteer identified more with “not prepared” individually or as a family for a
141 disaster (CI 95%, $p < 0.01$). The numbers of respondents by care area included a mixed response
142 from the different sections within the hospital with over 50% (n= 484) from direct care roles (e.g.
143 physicians, nurses, Patient Care Technicians, etc.), approximately 30% (n=289) from supportive
144 care roles (administrative, finance, technology, etc.) and just under 20% (n=189) from indirect
145 care roles (Guest Services, laboratory, pharmacy, radiology, etc.) (Table 3). Similarly,
146 respondents reporting years of service at the hospital captured a diverse representation (<1 year
147 to >20 years) with the largest percentage (29.2%, n=282) from within the 1 to 5 year group.
148 When comparing team volunteers to non-volunteers those individuals between “11 to 15 years”
149 of service were less likely to participate by a statistically significant factor (CI 95%, $p = 0.02$)
150 (Table 3).

151 The survey findings addressed applicable work history by identifying 37% (n=357) of
152 respondents with a background in disaster response with nearly 75% (n=267) of those
153 individuals also volunteering for the augmentation team. When comparing team volunteers with
154 non-volunteers, under the umbrella of experience in disaster response, the survey findings
155 paralleled the literature, displaying those who volunteered for the team to also be more qualified
156 (CI 95%, $p < 0.001$) (Table 3).

157 Further analysis of the 60% (n=580) of respondents who expressed future interest in the
158 hospital emergency response augmentation team revealed that the greatest raw count of
159 volunteers came from acute care units (n=57), while the highest proportion from within
160 technology services (n=37, including Epic, Health Information Technology, Health Information
161 Services, etc. areas; CI 95%, $p=0.09$). Emergency Services (including Emergency Department
162 employees) were excluded from this analysis given the fact that the augmentation team is
163 designed to assist the emergency department during a disaster. While these employees may be
164 called upon while they are off-duty (n=37) they will be excluded from prospective future
165 strategic recruitment areas for future team development in order to mitigate any conflicts of
166 participation perceptions with their leadership (Table 4).

167 **Phase 2.** When comparing the phase 1-survey results in which 60% (n=580) of the respondents
168 endorsed “yes” that they had interest in disaster augmentation team participation, 53.3% (n=309)
169 of them provided their contact information differentiating those genuinely interested.

170 **Phase 3.** Forty-three participants signed up (14.4% response rate) with a total of 13 individuals
171 actually attending (4.3% of originally interested n=309, 30.2% attendance of anticipated n=43)
172 the training sessions. One hundred and thirty-five (45.3% response rate) responded to the survey
173 aimed to determine the presence of supplementary barriers unique to this sample with
174 approximately 9% (n=12) of respondents having attended the scheduled training representing
175 92.3% of all attendees (n=13). The barriers to initial training attendance, identified by those who
176 did not attend training (n=123), fell into one of six different categories: (a) the scheduling; (b)
177 the communication of the training; (c) lack of continued interest; (d) unsupportive chain of
178 command; (e) the location; and (f) time commitment of training not meeting the respondents
179 expectations . Many of the qualitative comments mentioned within this section focused around

180 scheduling and communication including: “I need over 9 weeks advance notice in order to ask
181 off,” “The notification of the event was not made in time enough to adjust work schedule,” and
182 “Don’t recall receiving an invitation.”

183 Discussion

184 **Preparedness.** Based on consistencies with the literature if most respondents had the impression
185 that the hospital was overly prepared, they might not want to volunteer for a team to support
186 future preparedness. This was not the case; in fact, an impressive 72% (n=700) of the employees
187 felt the hospital was “prepared” to “very prepared,” and still 60% (n=580) of these employees
188 reported that they would volunteer for the augmentation team. Further, those who did not
189 volunteer for the augmentation team reported “not prepared” individually or as a family for a
190 disaster ($p <0.01$). This statistically significant may simply mean that those who are not
191 organized for a disaster at home are less likely to want to leave and help others more readily.
192 However, taking these findings further could posture future recruitment efforts. Conceivably by
193 providing personal and at home preparedness training to hospital employees may enable them to
194 more readily support the hospital during a disaster on an augmentation team. Additionally,
195 improving personal preparedness has broader implications beyond the development of the
196 augmentation team and the hospital Human Resources department should logically consider
197 providing formalized person preparedness education to all employees. In order to sustain the
198 workforce as a whole and invest in a healthy work environment routine disaster preparedness
199 training should be a part of the organizational manpower blueprint. If an employee has a tool kit
200 of personal preparedness training and can take comfort in knowing their family is organized
201 during such events they may be more personally effective at work during times of crisis.

202 Overall, these findings demonstrate in the respondents' perceptions, the hospital appears to be
203 prepared and therefore the hospital Emergency Services leadership is achieving their outcomes.

204 **Qualified Personnel.** This project identified 580 individuals who were interested in
205 participating in a disaster augmentation team with 46% (n=267) also reporting applicable work
206 history or experience in disaster preparedness (Table 3)^{4,5}. This subgroup of individuals
207 demonstrates that the hospital does have qualified personnel to develop the team. Going a step
208 further, the survey findings mirrored the literature, comparing team volunteers with non-
209 volunteers, demonstrating at a statistically significant proportion that respondents who were
210 qualified for team membership did also volunteer ($p<0.001$). These respondents also provided a
211 diverse representation of the hospital, which is critical to not deplete any one section while also
212 supporting continuous high quality medical treatment for its patients. One section that was over
213 represented from within the qualified respondents was Emergency Services. In order to
214 accurately improve the response capacity of emergency departments during a disaster, qualified
215 Emergency Services employees (n=28) may need to concentrate their efforts to support the ED,
216 and therefore should not be considered in the qualified figures. After removing these employees
217 from the count 239 individuals qualify to develop an augmentation team. Overall, the hospital
218 has 1.6% (n=239) of its current 14,933 employees as qualified personnel to begin building an
219 augmentation team. This is a solid starting pool of capable individuals to focus future
220 recruitment efforts and grow the team.

221 **Interest In Future Team Engagement.** It is often easier to volunteer in theory than in practice
222 and when prompted for future engagement, just over half, 53.3% (n=309), of respondents who
223 validated they would volunteer actually provided their contact information. Of the original 580
224 respondents who had expressed interest in the augmentation team 7.4% (n=43) signed up for the

225 initial team training with only 2.3% (n=13) actually attending. Executing the training phase of
226 this project demonstrated how large a gap could exist between willingness to serve on a disaster
227 augmentation team and functional participation. However, training 13 people is the first step in
228 many to full development of the augmentation team. These 13 trained augmentation team
229 volunteers support a solid foundation from which to build. Paralleling the literature this group is
230 comprised of: (a) all volunteers,^{4,56-8} (b) had applicable work^{4,5}; (c) mixed non-clinical and
231 clinical backgrounds^{2,4,6,7,9,10} and (d) embodied at least one team of 6-8 members^{4,5,7,8,10,11}
232 although not quite the expressed minimum of 20 members suggested to sustain 24-hour scene
233 support² (Table 3).

234 **Barriers to Current and Future Participation.** The barriers identified in this project did not
235 parallel those of the research as closely as many of the other findings. In this project only 2.3%
236 (n=13) of the originally identified interested volunteers participated in training but 23.3%
237 (n=135) of them responded to the barriers and facilitators survey demonstrating there is room for
238 future participation and team growth. The predominant barriers to initial training attendance
239 were: (a) scheduling and; (b) awareness of the training. Both of these factors can be mitigated by
240 providing additional training opportunities at different times and at least 9 to 10 weeks in
241 advance for those on a clinical schedule. This program fell short by only allowed seven weeks of
242 advanced notice for the participants to plan accordingly. Additionally, there was only one
243 notification of training. Based on the qualitative feedback of the survey more than one email
244 invitation with training reminders would be a more effective means of clearly communicating
245 opportunities. Neither of these barriers were identified within the literature and appear unique to
246 this sample group.

247 A non-barrier to this population but identified in the literature as the largest obstacle to
248 augmentation team development was financial due to the up front costs of training ⁷⁻⁹. This
249 project established stakeholder buy-in early and an enormous support in the form of time and
250 resources from the Emergency Services department at the hospital. Due to this on-going
251 leadership investment augmentation team membership will soon accompany a new
252 supplemental job description with an established pay rate for future participation and activation.
253 This effort will undoubtedly grasp the interest of individuals who may have not volunteered
254 originally without identified compensation.

255 One unmeasured barrier that was identified in the literature is team turnover reporting a
256 span of three years to develop a consistent reliable team due to such turnover ⁹. It is too early to
257 tell if the 13 individuals who have received training will continue to participate. The next phase
258 of team membership and participation planned for this group is training in PPE donning and
259 doffing as well as practical HAZMAT MCE exercise scheduled in 2016.

260 **Recommendations For Future Development and Research.** This project provided one way to
261 recruit and develop a disaster augmentation team that if continued will undoubtedly improve the
262 hospitals disaster response capabilities. Whether these recruitment strategies are sustainable is
263 still to be determined and should be the focus of future research. The first survey deployed, in
264 phase 1, revealed sections within the hospital the augmentation team volunteers originated from.
265 Technology Services areas demonstrated the most approaching statistically significant proportion
266 of interest and should be one of the first areas to recruit from for future operations and
267 sustainment. Other areas such as: (a) acute care; (b) microbiology/ laboratory; (c) critical care;
268 and (d) administrative sections demonstrated an increased interest in the augmentation team and
269 should also be in future team recruitment plans (Table 4). Most of these areas of recruitment are

270 clinically based, however, the volunteerism from Technology Services and administrative
271 sections demonstrates how ancillary support services within a hospital may have a motivation
272 and desire to help during a disaster much like those in a clinically based primary care roles.
273 These departments should not be overlooked and will provide an essential balance to the
274 augmentation team as a whole.

275 An additional future augmentation team recruitment target population revealed by the
276 phase 1 survey focused on respondent's years of experience working at the academic medical
277 center. Nearly half (47.3%) of the augmentation team volunteers had less than or equal to five
278 years working at the hospital. With this in mind new employee orientation and/or annual
279 training requirements should provide an opportunity to offer team membership directed at newer
280 employees. It is not clear exactly why the newer employed cohort shows a greater interest in the
281 augmentation team but team membership may strengthen their resume toward climbing the
282 clinical or administrative ladder. Conversely, the survey also revealed areas to provide fewer
283 recruitment efforts. Interestingly, respondents with 11 to 15 years of employment at the hospital
284 were statistically significantly ($p = 0.02$, Table 3) less likely to volunteer for the augmentation
285 team. Their exact motivations are not known but it may be due to the developmental stage in
286 their career. After 10 years of employment this cohort of individuals may hold roles of great
287 leadership responsibility and may experience supplementary duties that consume free time and
288 therefore cannot readily volunteer for the team. A better understanding of these differences in
289 volunteerism based on years of employment could be the focus of future research in volunteer
290 motivations.

291 In order to maintain interest and readiness to serve the hospital the next training sessions
292 should be scheduled in a timely manner, providing 9 to 10 weeks advanced notice and offered

293 quarterly. With 108 of hospital employees expressing future interest in the augmentation team,
294 who were not able to attend due to timing or being uninformed of the initial training sessions,
295 there is potential for team immediate growth in the months to come. The length of training
296 should be considered and continued to be based on the literature in a tiered approach and not all
297 at once to allow for a continued balance between primary institutional responsibilities and
298 augmentation team duties ^{5-8,10}. The training provided in phase 3 was conducted over a 2-hour
299 block seemed to fit the sample's expectations with only 1.6 % (n=2) of respondents identifying
300 this duration to be too long.

301 Overall, this project provided a foundational start toward assembling an optimal
302 augmentation team key to operational success during a disaster while ensuring safety and timely
303 and appropriate patient care.

304 **Strengths of the Design.** Population sampling of the entire hospital staff provided both an
305 uncomplicated and inexpensive approach to assess availability and interest of personnel for a
306 hospital based augmentation team. Utilizing a survey method offered the best opportunity to
307 obtain direct, relevant data. Better understanding of qualified employees as well as the barriers
308 and facilitators to developing this team allows for more focused recruitment, training, and
309 sustainment of the team in the future. Furthermore, the results of this study will be applicable to
310 other organizations intending to establish a hospital augmentation team in similar geographic
311 areas and settings.

312 **Limitations of the Design.** Utilizing an electronic based population sample of medical center
313 staff through email may limit participation to only those individuals who feel comfortable using
314 technology. Additionally, this survey approach reflects a non-response bias where the
315 investigator cannot know if the respondents are truly representative of the broader population.

316 Based on the demographics of the sample the results may not be broadly generalizable and
317 limited to similar medical centers and regions.

318 **Implications for Emergency Nurses.** This project contributes to a better understanding of the
319 development of hospital-based HAZMAT teams to augmentation the emergency department.
320 This project aimed to improve the response capacity of the emergency departments during a
321 disaster, supporting safe and high quality continued continuity of care operations that will impact
322 nurses who comprise the largest single component of hospital staff. The emergency department
323 does not have to respond in a silo and training a team to help augment a surge of patients will not
324 only improve response time and quality during a disaster but also provide an improves sense of
325 preparedness throughout the hospital. Developing an augmentation team may be the solution for
326 those emergency departments whose operational plans in place may not be fully adequate for the
327 worst-case type scenarios. Additionally, this project demonstrates how nurse responsibility in
328 systems leadership can strengthen practice excellence, promote patient safety, and enhance
329 health care delivery. Advancing knowledge of the characteristics and environmental factors that
330 promote or detract from the development of an augmentation team may inform future strategies
331 for recruiting and sustaining teams of this type.

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TABLE 1

Literature Review Results and Summary on Augmentation Teams

Composition	Size	Training	Barriers
• Volunteers due to inherent risk ⁴⁻⁸	• Goal of at least 20 members for 24 hours scene sustainment ²	• Tiered, short training sessions not 8 hour blocks to prevent burn out and turnover ^{5-8,10}	• Financial backing to fund training ^{5,6,8}
• Applicable work history (EMS, Fire, Military, etc.) to reduce turnover ^{4,5}	• 6-8 members adjusting as the situation permits ^{3-5,7,8,10}		• Big time commitment with training and drills causing staffing turnover ^{4,6,9,10}
• Mixed clinical and non-clinical to reduced compromising one area ^{2,4,6,7,9,10}			

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TABLE 2

Demographic Characteristics of 966 Participants Completing a Survey Instrument Measuring Hospital Employee's Emergency Response Augmentation Team Qualifications and Interest, 2015

Characteristics	N=966 n (%)	Volunteers, n=580 n (%)
Gender		
Female	734 (76.0)	427 (73.6)
Male	205 (21.2)	136 (23.4)
Non-binary	1 (0.1)	1 (0.2)
Unspecified	26 (2.7)	16 (2.8)
Age		
18 to 24	45 (4.7)	26 (4.5)
25 to 34	190 (19.7)	116 (20.0)
35 to 44	152 (15.7)	87 (15.0)
45 to 54	250 (25.9)	151 (26.0)
55 to 64	270 (28.0)	165 (28.4)
65 to 74	26 (2.7)	18 (3.1)
>75	4 (0.4)	3 (0.5)
Unspecified	29 (3.0)	14 (2.4)
Race		
American Indian/Alaskan Native		7 (1.2)
Native	8 (0.8)	
Asian	14 (1.4)	12 (2.1)
Black/African American	66 (6.8)	41 (7.1)
Multi-Racial	19 (2.0)	11 (1.9)
Native Hawaiian/Pacific Islander	3 (0.3)	3 (0.5)
White or Caucasian	785 (81.3)	427 (81.7)
Unspecified	71 (7.3)	32 (5.5)

Note. Percentages may not equal 100 because of rounding

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TABLE 3

Work Characteristics of 966 Participants Completing a Survey Instrument Measuring Hospital Employee's Emergency Response Augmentation Team Qualifications and Interest, 2015

Characteristics	All N=966 n (%)	Volunteers n=580 n (%)	Non-Volunteers n=141 n (%)	p-value
Years of Service				
<1	146 (15.1)	96 (16.6)	16 (11.3)	
1-5	282 (29.2)	178 (30.7)	38 (27.0)	
6-10	146 (15.1)	88 (15.2)	21 (14.9)	
11-15	115 (11.9)	62 (10.7)	27 (19.1)	0.02
16-20	80 (8.3)	44 (7.6)	15 (10.6)	
>20	189 (19.6)	109 (18.8)	22 (15.6)	
Unspecified	8 (0.8)	3 (0.5)	2 (1.4)	
Patient Care Role				
Direct	484 (50.1)	302 (52.1)	67 (47.5)	
Supportive	289 (29.9)	151 (26.0)	39 (27.7)	
Indirect	187 (19.4)	126 (26.0)	33 (23.4)	
Unspecified	6 (0.6)	1 (0.0)	2 (1.4)	
Disaster Experience				
Yes	357 (37.0)	267 (46.0)	22 (15.6)	<0.01
No	609 (63.0)	313 (54.0)	119 (84.4)	<0.01
Team Interest				
Yes	580 (60.0)	580 (100)	0 (0)	
No	141 (14.6)	0 (0)	141 (100)	
Undecided	245 (25.4)	0 (0)	0 (0)	

Note. Percentages may not equal 100 because of rounding

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TABLE 4

Top 10 Areas of Work within the Hospital of 966 Participants Completing a Survey Instrument Measuring Employee's Emergency Response Augmentation Team Qualifications and Interest, 2015

Area of Work	All N=966 n (%)	Volunteers n=580 n (%)	% of N	p-value	95% CI
Acute Care*	82 (8.5)	57 (9.8)	69.5	0.15	(58.2 - 80.8%)
Administration*	86 (8.9)	54 (9.3)	62.8	0.69	(51.7 - 73.9%)
Ambulatory Care	98 (10.1)	51 (8.8)	52.0		
Critical Care*	45 (4.7)	30 (5.2)	66.7	0.52	(51.7 - 81.6%)
Emergency Services	45 (4.7)	37 (6.4)	82.2		
Pediatrics	57 (5.9)	27 (4.7)	47.4		
Perioperative	74 (7.7)	43 (7.4)	58.1		
Radiology and Medical Imaging	47 (4.9)	26 (4.5)	55.3		
Technology Services*	50 (5.2)	37 (6.4)	74.0	0.09	(59.8 - 88.2%)
Microbiology/Laboratory*	36 (3.7)	25 (4.3)	69.4	0.40	(52.8 - 86.1%)

*Areas with ≥60% proportions of interest in the augmentation team & hold higher than average potential future recruitment success

Note. Percentages may not equal 100 because of rounding

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In reply, please refer to: Project # 2015-0307-00

August 18, 2015

Megan Matters and Dorothy Tullmann
Academic Divisions
142 Burnet St.
Charlottesville, VA 22902

Dear Megan Matters and Dorothy Tullmann:

Thank you for submitting your project entitled: "Hospital Emergency Augmentation Team Development" for review by the Institutional Review Board for the Social & Behavioral Sciences. The Board reviewed your Protocol on August 18, 2015.

The first action that the Board takes with a new project is to decide whether the project is exempt from a more detailed review by the Board because the project may fall into one of the categories of research described as "exempt" in the Code of Federal Regulations. Since the Board, and not individual researchers, is authorized to classify a project as exempt, we requested that you submit the materials describing your project so that we could make this initial decision.

As a result of this request, we have reviewed your project and classified it as exempt from further review by the Board for a period of four years. This means that you may conduct the study as planned and you are not required to submit requests for continuation until the end of the fourth year.

This project # 2015-0307-00 has been exempted for the period August 18, 2015 to August 17, 2019. If the study continues beyond the approval period, you will need to submit a continuation request to the Board. If you make changes in the study, you will need to notify the Board of the changes.

Sincerely,

A handwritten signature in black ink that appears to read "Tonya R. Moon".

Tonya R. Moon, Ph.D.
Chair, Institutional Review Board for the Social and Behavioral Sciences

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